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THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

Volume VIII | MAY, 1935 | No. 3

Uses of Controlled Atmospheres Are Feature at Dayton

Reported by Richard R. Kennedy

The annual tri-chapter meeting of the Cincinnati, Columbus, and Dayton Chapters was held in Dayton on April 15. The meeting opened with a luncheon attended by national officers and officers of the participating chapters.

A technical session was held in the afternoon on the subject of "Controlled Atmospheres" with Ray T. Bayless of the National Office as chairman.

The first speaker was H. M. Webber of the General Electric Co., who presented a paper on "The Use of Controlled Atmospheres in the Joining of Metals." Mr. Webber traced the development of copper brazing from its early limited application to its wide and varied use today, and described the process. Hydrogen was originally used as a protective atmosphere, but the cost is high when large volumes of the gas are required. Dissociated ammonia has also been used successfully. The type of atmosphere which is giving best results at the present time consists of cracked and partially burned natural gas from which free carbon and moisture are removed before the gas is conducted into the furnace. A typical composition is 20% hydrogen, 12% CO, 3% CO_2, and 65% nitrogen.

Mr. Webber cited a number of applications of copper brazing. Perhaps the most interesting to local members is that of the National Cash Register Co., where more than 500 cash register parts are now copper brazed. The strength has been increased from 50 to 250% and the cost reduced from 30 to 90%.

The second paper was presented by S. K. Oliver of the Delco Products Co. on "The Use of Controlled Atmospheres in the Heat Treatment of Tools." Mr. Oliver gave the results of an investigation conducted under operating conditions rather than on a laboratory scale to determine the most suitable furnace atmosphere for hardening various types of tool steels.

Oxidizing atmospheres cause scale to form on the tools while reducing at-

(Continued on page 4)

Best Pouring Temperature For Cast Iron Is 1375° C.

Reported by George P. Halliwell

Pittsburgh Chapter, Feb. 15—At a meeting held in conjunction with the local society of the American Foundrymen's Association, Dr. James T. MacKenzie spoke on "Cast Iron." This talk was reported in the last issue of THE REVIEW and will not be summarized again here.

Jerome Strauss acted as discussion leader and called upon Mr. Templin of the Aluminum Co. of America, who introduced the subject of the elastic limit of cast iron. Mr. MacKenzie said he preferred to use the drop test, as it seemed to give a better idea of the susceptibility to permanent set.

In further discussion, Mr. MacKenzie emphasized that too high a pouring temperature results in low tensile strength, whereas too low a temperature results in blow-holes. Best pouring temperature seems to be 1375° C.

Difficulty has been experienced in reading the optical pyrometer correctly above and below this temperature. Above it the clean surface of the iron is likely to produce lower readings, while a film of silicon and manganese oxides covering the iron raises the readings obtained below 1375° above the true temperature.

Cyanide Hardening Baths of 3 Types

Reported by Scott C. Taylor

Detroit Chapter, March 11—A very interesting address was presented by Walter M. Gager of Roessler & Hasslacher on the subject of "Sodium Cyanide—Its Manufacture and Application to the Steel Treating Industry."

The Castner process of manufacture was first explained and illustrated by lantern slides. The general properties of commercial cyanide were next discussed, such as specific gravity, melting points of various mixtures, solubility, and poisonous characteristics.

The main interest to this group, of course, was the use of cyanide for hardening baths. There are three types: (a) Regular cyanide baths—sodium cyanide salts, (b) energized baths — calcium chloride base, energized with cyanide, (c) accelerated baths — containing barium chloride or some similar material.

Mr. Gager discussed the general composition of the regular cyanide bath, the troubles encountered and their remedies. Depth and character of case depend on four conditions: Time, temperature, cyanide content of bath, and type of steel.

The case produced in energized baths contains more carbon than nitrogen, which is the reverse of that produced by the first type. These baths produce deeper cases, but have the disadvantages of causing rusting after the steel is hardened and of difficulty in washing.

The accelerated baths are faster, and deeper penetration can be obtained.

It was also brought out that liquid baths containing cyanide can be used for hardening nitralloys. The speaker also mentioned the fact that a process for introducing ammonia into a cyanide bath, cracked and activated by a corona, has been patented, for which deeper and harder cases are claimed.

Scheid's Tool Steel Talk Given to Peoria Group

Reported by Carl B. Rex

Peoria Chapter, March 11—The meeting was under the direction of Chairman E. J. P. Fisher who announced the appointment of a nominating committee to act on the selection of candidates for office.

The technical program was directed by F. F. Streibich, general superintendent of the R. Herschel Mfg. Co. After a brief talk on the advantages to be derived from Chapter activities, he introduced the speaker of the evening, A. J. Scheid, chief metallurgist of the Columbia Tool Steel Co. His topic, "Factors Affecting Tool Steel Performance," was reported earlier this season. It was illustrated by lantern slides and the fracturing of "St. Ruperts Drops," a novelty which appealed very highly to all present.

Exhibit Sales for National Metal Show Already Exceed Last Year's

Space in South Hall of International Amphitheatre to Be Enlarged; 149 Reservations Already Made

Again the annual National Metal Congress and Exposition, to be held in Chicago, Sept. 30 to Oct. 4, is going to be the biggest show since the record year of 1929.

So was the 1934 Exposition at New York, but this year, with four months yet to go, the sale of exhibit space at the International Amphitheatre exceeds by nearly $12,000 the total sale of space made last year.

All the space in the North Hall and the Arena and approximately half the space in the South Hall has been reserved, and in order to take care of reservations yet to come, it will be necessary to enlarge the space laid out in the South Hall.

A space in the South Hall of approximately 10,000 sq.ft. will be devoted to the Midwest Group Section, a joint exhibit by a number of firms representing industries of that section. This big feature of the Exposition will be under the direction of the Chicago chapter.

Firms who have reserved space number 149. They are as follows:

Gas Section exhibitors (10)

Air Reduction Sales., Ajax Electric Co., Ajax Electrothermic Corp., Allegheny Steel Co., Edgar Allen Steel Co., American Brass Co., American Car & Foundry Co., American Manganese Steel Co., American Metal Market, American Rolling Mill Co., American Sheet & Tin Plate Co., American Steel & Wire Co., Aurora Metal Co.

Babcock & Wilcox Co., Baldwin-Southwark Corp., Bastian-Blessing Co., Bausch & Lomb Optical Co., Bell & Gossett Co., Bethlehem Steel Co., G. S. Blakeslee & Co., Bristol Co., Brown Instrument Co.

Andrew C. Campbell Div. of American Chain Co., Carboloy Co., Carborundum Co., Carnegie Steel Co., Carpenter Steel Co., Case Hardening Service Co., Chapman Valve Mfg. Co., Chicago Steel Foundry Co., Climax Molybdenum Co., Colonial Broach Co., Columbia Tool Steel Co., Crucible Steel Co.

Darwin & Milner, Inc., Despatch Oven Co., Detroit Tap & Tool Co., Dow Chemical Co., Driver-Harris Co., E. I. Du Pont De Nemours & Co., Duriron Co., Inc.

Electric Furnace Co., Electro Metallurgical Sales Corp., Firth Sterling Steel Co., J. B. Ford Sales Co., Foxboro Co.

Gathmann Engineering Co., General Alloys Co., General Electric Co., General Electric X-Ray Corp., Globar Corp., Gogan Machine Corp., Claud S. Gordon Co., Grasselli Chemical Co.,

(Continued on page 7)

Nominations for New Officers

In accordance with the Constitution of the American Society for Metals, the Nominating Committee appointed by President Shepherd met on Monday morning, May 20, in the Keystone Hotel, Pittsburgh.

Those present were James P. Gill, chairman, R. T. Porter, S. L. Hoyt, F. A. Elshoff, T. J. Black, S. A. Silbermann, and D. M. Fraser.

The following nominations were made:

For President ----------R. S. Archer, Republic Steel Corp.

For Vice-President----------E. C. Bain, U. S. Steel Corp.

For Treasurer--W. P. Woodside, Molybdenum Corp. of America

For Trustees (2)-----R. L. Kenyon, American Rolling Mill Co.
S. C. Spalding, American Brass Co.

Information Needed on Grain Boundary Attack of the Stainless Steels

Reported by A. O. Schaefer

Philadelphia Chapter, April 26—Dr. H. L. Maxwell's talk on "Stainless Steels in the Chemical Industries," a card trick artist, and the annual election of officers shared the spotlight at the final meeting of the season.

The Tellers Committee reported the following officers for next season: Chairman, George W. Keller of the George W. Keller Co. (charter member of the Philadelphia Chapter); Vice-Chairman, Dr. T. Holland Nelson, Consulting Metallurgist (well-known as a chapter speaker); new Directors, A. W. Grosvenor of Drexel Institute, John W. Harsch of Leeds & Northrup Co., and Charles H. Stoeckle of Crucible Steel Co. of America. The Secretary-Treasurer, A. O. Schaefer of Midvale Company, remains unchanged.

Dr. Maxwell's experience, as metallurgist for E. I. du Pont de Nemours, one of the largest companies in the world dealing with chemical products, formed a valuable background to his remarks. A series of excellent slides showed many of the types of equipment using stainless steels.

The speaker devoted some time to the applications of clad and other corrosion resistant metals, and also considered trouble shooting, or the running down of failures to their ultimate causes.

He feels that much fundamental information is lacking on grain boundary attack of corrosion resistant steels, and that there is a definite need for alloys more resistant to such attack.

In the discussion the heat treatment of large vessels proved fascinating, but the greater part of the remarks were directed toward intercrystalline attack, particularly by hydrogen.

Entertainment was furnished at the dinner preceding the meeting by Gus Bohn, a professional card trick artist. Cards were made to appear in odd places, and nobody offered to take on the entertainer at either pinochle or poker.

A.S.M. and S.A.E. Hear of Automotive Developments

Reported by Gordon T. Williams

Cleveland Chapter, March 11—The annual joint meeting of the Cleveland A.S.M. and S.A.E. offered Mr. Joseph Geschelin, engineering editor of "Automotive Industries," as principal speaker.

Mr. Geschelin is widely known for his page of "Production Lines" and his frequent articles on manufacturing and engineering. His address titled "Automotive Developments and Their Relation to Modern Manufacturing Technique" gave an excellent broad survey of new materials and their current applications.

Typical high spots of Mr. Geschelin's paper were his comments on spring suspension design, steel tops, bearing metals, plastics, alloy irons, machining equipment. In each case and many others he gave a brief but effective account of current practice and probable trend. Such surveys as this are of great value in coordinating and stimulating thought.

Coffee talker was Earle Martin, editor of the Cleveland News. His remarks on "Fires, Floods, Flashes, and Fortune" gave an interesting picture of the more romantic phases of journalism.

Chairman Ross of the A.S.M. introduced the officers of the two cooperating societies and presented Ferd Jehle of the S.A.E. who ably presided as technical chairman.

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RAY T. BAYLESS ..... *Editor*
M. R. HYSLOP ..... *Managing Editor*

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New High Tensile Steel Resists Rust

Reported by G. Sproule

Montreal Chapter, Feb. 4—In the interval between dinner and business, members and guests were treated to several reels of motion pictures illustrating the art of skiing, presented by popular W. B. (Bill) Thompson of Shawinigan Stainless Steel and Alloys.

The lecture was given by Albert F. Stuebling of United States Steel Corp., and was entitled "Developments in Low Alloy High Tensile Steels." Assuming that his audience was familiar with the medium manganese, silico-manganese, "Cromansil," and other such steels, Mr. Stuebling devoted himself to "U.S.S. Corten."

This steel, recently developed, analyzes: carbon about 0.10%, manganese 0.10 to 0.30, chromium 0.50 to 1.50, copper below 0.50, silicon 0.50 to 1.00, and phosphorus 0.10 to 0.20. The most striking feature is, of course, the high phosphorus; 0.1% is said to equal 0.35% C in strengthening effect—in low carbon steel.

U. S. S. Corten is said to be more corrosion resistant than ordinary copper steel; it has been tested in the construction of 200 freight cars and 100 passenger cars, for 30% of car repairs are due to rusting. It shows marked improvement over standard structural steel in physical properties, and they are not much affected by heat treatment.

Shop practices for Corten are only slightly modified; machining rates are lower; 5/8 in. is the limit for punching. 7/8 in. for cold flanging. It can be welded with suitable coated electrodes, and by spot welding.

Sharp Corners Avoided In Aero Engine Design

Reported by W. R. Frazer

New Jersey Chapter, March 11—Speaker of the evening was Mr. B. Clements, Metallurgist, Wright Aeronautical Corp., Paterson, N. J., who spoke on "Aircraft Engine Materials."

Mr. Clements stressed in particular the necessity of eliminating sharp corners in the design of parts, and also tool scratches which are likely to be a source of fatigue failures. He also explained the use of the Magnaflux method of inspecting for hardening cracks, grinding cracks, seams, and other defects as a standard routine inspection of all ferrous parts.

In the non-ferrous field, he discussed the use of aluminum alloy forgings and castings, and magnesium alloy castings.

An additional feature of this meeting was a special talk by Stanley R. Keith, metallurgist, A. P. Smith Co., East Orange, N. J., who was called on by the State of New Jersey to investigate the nails in the ladder that was found on the Lindbergh estate. We were all impressed with the research work which Mr. Keith had done and the positive proof he exhibited for identification of the nails.

Primitive Metallurgy in Inland China Described

Reported by D. F. McFarland

Penn State Group, March 22—William A. Haven of Cleveland addressed the Penn State Metallurgical Society Group on "Metallurgical Developments in the Far East."

Mr. Haven traced the influence of American metallurgical engineers on the development of the modern high efficiency blast furnace, and cited the prestige which this has brought as the reason why American engineers are called upon to give advice, and to design and construct new iron and steel plants in other parts of the world.

He then described some of his experiences as a metallurgical consultant to the Chinese Government in Southern China. His visits to inland coal and iron mines took him to places where a white man is seldom seen and where the only means of transportation is by coolie-borne chairs or by fast-moving boats in torrential rivers. His description of a primitive 5 ft. blast furnace, producing a maximum of a few hundred pounds of iron per day and using a "one-man-power blast," was especially amusing.

Importance of Ductility Of Welds Is Stressed

Reported by F. H. Clark

New York Chapter, April 22—A joint meeting with the American Welding Society was held, at which Dr. Jacobus, president of the A.W.S., spoke a few words of welcome. J. J. Crowe presided as technical chairman for an address on "Some Metallurgical Aspects of Welding" by Leon C. Bibber, senior welding engineer, Bureau of Construction and Repair, U. S. Navy Department.

Mr. Bibber's talk covered metal arc welding from the point of view of the effect on the weld metal and base metal. Multiple bead welds have high yield point, fine grain, and a normal McQuaid-Ehn test. Mr. Bibber believes that columnar type welds, by contrast, have lower ductility.

In fillet welds it is most important to have no undercutting and a 30% convexity ratio. Again a deposition of many layers is an improvement and thickness of plate is also important.

In the lively discussion that followed, Dr. Mitchell complimented Mr. Bibber on his attempt to introduce numerical factors in welding.

Sam Tour inquired if it were a good thing to go over a single bead weld with a torch. Mr. Bibber replied that this is really local stress relieving, which is applicable on pressure vessels, for example, but in large construction jobs such as ship building, where annealing is impracticable, multiple bead welding is superior.

J. J. Crowe asked if tensile strength data were not as important as ductility; Mr. Bibber replied in the negative.

Dr. R. H. Aborn suggested that the normal McQuaid-Ehn test results with multiple bead welding might be due to uniformity, chemical or otherwise.

Grain Control Marks Advance In Steel Making

Reported by J. W. McBean

Ontario Chapter, March 1—The program after dinner was varied by presentation of a silver service to Secretary L. F. Fitzpatrick. This only faintly expressed our appreciation of the enormous amount of work he has unselfishly devoted to the interests of the Chapter.

The technical talk was by Norman Tisdale of the Molybdenum Corp. of America on "This Thing Called Grain Size." As he pointed out, we have a tendency to over-emphasize the value of anything new and forget that good practice in steel making is as important as ever. However, the work on grain size and the ability to control it has marked a tremendous advance.

Causes and cure of various troubles were taken up—in one case, a careful investigation of the effect of various temperatures on the quenching cycle showed that better results could be obtained by close restriction of the quenching temperatures.

It was shown that the extra care required to produce a fine grained steel necessitated a higher price. A number of etched and fractured samples were passed around and a brief explanation of the theory was given.

The coarse grained steels are deep hardening and easily machined, but have only a limited hardening range before coarsening, a loss of toughness, a tendency to warp and decarburize more than the fine grained varieties. The tensile strength of the coarse grained steel may be as high as that of the fine grained, but the latter has the advantages of a higher elastic limit, impact strength, and toughness. The fine grained varieties show more trouble from soft spots.

Thus we see that it is necessary to choose the most important properties for the particular application. A coarse grain might be satisfactory in a 4-in. section, but not in a lighter section or one with considerable variation.

In gears where warpage would produce serious results in operation, a coarse grained steel would have to be avoided, but in other gears machinability might be the important consideration.

In the S.A.E. 4615 carburizing steel a fine grain will often enable gears to be quenched directly from the box with satisfactory results and with reduction in heat treating cost. This depends on making a steel which does not coarsen much at any point up to the carburizing temperature.

In tool steels a fine grain is generally required to get the maximum elastic limit and toughness. One advantage of alloys in these steels is the tendency to keep the grain fine even at high temperatures.

A considerable number of slides were used to illustrate this very timely talk.

Discussion of Members' Problems Follows Talks

Reported by L. E. Raymond

New Haven Chapter, February 21—The meeting was divided into two phases, the first consisting of three short talks.

L. E. Raymond, metallurgist for the Singer Mfg. Co. spoke on refractories and insulating materials.

D. W. Fryback, sales engineer for Brown Instrument Co. gave a very interesting talk on his experiences in Soviet Russia, emphasizing the metallurgical trials and tribulations which he experienced in setting up a modern pyrometric control system in a Russian plant.

D. A. Nemser of International Nickel Co. then addressed the chapter on grain size, and with the aid of a few slides, reduced the Grain Size Symposium of the last National Metal Congress to a brief talk which was clear to the least technical member of the Chapter.

The second phase of the meeting was devoted to discussing such metallurgical problems as the members cared to bring up. Each question was so thoroughly discussed that the originator had plenty of material for thought.

Following adjournment the Society was treated by the Bristol Co. to hot turkey sandwiches and coffee.

Odds *and* Ends

Speaking of the A. S. M. member's importance in the metal industry did you notice in the April issue of *Metal Progress* that 27 of the 29 members of the S. A. E. Standards Committee that worked out the new list of S. A. E. steels, are A. S. M. members? And the chairman of the group is a past president of the American Society for Metals!

* * *

To our way of thinking, however, the keenest "automotive engineer" of the month is the fellow who, unable to meet the monthly payment on his car, turned it in on a new one and blissfully went his way without paying a dime. We're waiting to see what he does next month. Maybe we can get a new car this year after all.

* * *

And before we leave the April issue, we hope you read Prof. Zavarine's article on Quenching. As Col. Stoopnagle would say, it's "peachy."

* * *

One of the best articles in the May *Metal Progress* is the one about Mr. Marsh and his development of resistance alloys for thermocouple elements. Don't miss it.

* * *

We'll concede the importance of grain control, but we bow our head in deepest reverence to the man who has discovered heat control for pepper pot soup. If you've ever stretched a hasty hand for a glass of water to quench a mouthful of pepper pot, you'll know what we mean.

This new soup is made from a mild recipe and you may add pepper to suit your own taste. (Note for pepper pot addicts: It's made by Phillips Packing Co.)

* * *

Alloy steels and non-ferrous metals continue their rivalry in the library. You may now select good-looking book ends in the form of an expanding scroll in either copper or chromium plated steel . . . And did you know that you can get folding metal awnings made of copper, aluminum and corrosion-resisting steel?

* * *

Stainless steel cooking utensils have often caught the eye of the housewife, but she has shied away from the price. However, one housewife, lucky enough to get a stainless steel roaster, finds that she can roast meat in three-quarters the time required in the ordinary enamelled roaster.

* * *

Like last year, the October *Metal Progress* will again be the National Metal Congress issue. Its setup in '34 proved so popular that the issue will again be divided into ten sections, each dealing with one branch of our metal industry.

This year these sections will contain feature articles relating to the title of the section. Space reservations already indicate that this issue will be "bigger and better." Intelligent foresight, we calls it.

* * *

By the way, have you noticed how *Metal Progress* has been increasing in number of editorial and advertising pages? The first five issues of this year contained more advertising than the same issues in any year since 1931.

* * *

And incidentally the May issue went to more readers (7431) than any other issue in M. P. history. (Advertisers please note!)

* * *

We doff our hat to the Mahr ad in the May issue. Its illustration is as striking as they come.

And did you notice the "pretty girl" ad in the April issue—it's on page 63.

A.P.F.

Who — What — Where

Director of research for Illinois Steel Co. is the new position of DR. MARCUS A. GROSSMANN, research engineer with the company since 1931.

M. A. Grossmann

Dr. Grossmann received his bachelor's degree from M.I.T. and his doctorate from Harvard. His metallurgical experience is wide and varied and includes several years with Republic and its subsidiaries before he joined Illinois Steel Co.

One of the early members (1919), Dr. Grossmann has long been active in A.S.M. affairs. He served a term on the Recommended Practice Committee and is at present on the Chicago Chapter Executive Committee. He was Campbell Memorial Lecturer in 1930 and has contributed many other valuable technical papers. Next fall he will present a course of lectures on heat treating at the Convention in Chicago.

In recognition of his contribution to the chemistry of steel analysis, control, and manufacture, CHARLES MORRIS JOHNSON has been elected to membership in Sigma Xi, honorary scientific fraternity. Mr. Johnson is chief chemist for Crucible Steel Co., Park Works, Pittsburgh, and has been an outstanding member of the Society for 17 years.

ERLE G. HILL has joined Lukens Steel Co., Coatesville, Pa., as director of research. He studied mining and metallurgy at University of California and did graduate work there, at Carnegie Tech, and University of Pittsburgh.

Hill's early work was as a mining engineer and metallurgist in the western states and Mexico. In 1918 he became an instructor in mining and metallurgy at Carnegie Tech, and in 1920 professor of metallurgy at University of Pittsburgh, resigning after ten years to accept a research fellowship at Mellon Institute.

He is a member of the A.I.M.E., A.S.T.M., and Franklin Institute, and has been a member of the A.S.M. since 1925 (Pittsburgh Chapter).

Formerly material engineer at the U. S. Naval Gun Factory, C. E. MARGERUM, Washington Chapter, has been promoted to senior material engineer at the Bureau of Ordnance, Navy Dept.

ALFRED O. TRAEGER, president of E. Leitz, Inc., member of the New York Chapter A. S. M. since 1922, this year celebrates his 25th year with the Leitz organization.

Alfred O. Traeger

Mr. Traeger was born in Wetzlar, Germany, a town famed for the manufacture of optical instruments. His first important position was with Hensoldt and Sons, manufacturers of optical instruments. In 1907 he joined the Leitz firm and was appointed head of the Frankford office.

So successful was he in converting the Frankford branch to a financially healthy state that when the United States branch showed itself in the red year after year, he was selected to take over its management in 1910.

This office was operated as a branch of the Leitz works to exploit and sell Leitz products in the United States, and when the War broke and imports ceased, Mr. Traeger purchased the firm himself and began manufacturing his own laboratory supplies. Now they are again handling the German Leitz imports, and Mr. Traeger is still the active and energetic head.

WALTER C. MAIN, for the past seven years in the Engineering Department of Standard Oil Co. of California, having complete charge of inspection, is now field engineer for Youngstown Sheet & Tube Co. in Los Angeles. He finds his work "pleasant, instructive, and right down the old alley."

He attended both Case School of Applied Science and University of Michigan, and later collected an imposing group of "firsts."

He installed the first laboratories and was the first metallurgist for the Steel Improvement & Forge Co., under the tutelage of R. R. Abbott, who was then chief metallurgist for the Peerless Motor Car Co., and one of the organizers of the Forge Co. He also installed the first laboratory for Parrish & Bingham, now part of the Midland Steel Products Co., and also was the first metallurgist employed by the Elyria Iron & Steel Co., now a subsidiary of Republic Steel Corp.

Walter Main joined the Society in 1918 or '19, previous to what is now considered the founding date. In those days meetings were held in the old Olmsted Hotel, Cleveland, where Bill Bidle was a sort of permanent chairman.

Dr. JOHN CHIPMAN has joined the staff of The American Rolling Mill Co. as associate director of the Research Laboratories. His work will be in the melting and refining of metals. For six years he has been in the Department of Engineering Research at University of Michigan.

John Chipman

Dr. Chipman was the recipient of the A. S. M. Howe Medal in 1934, being awarded this distinction for his paper on "The Application of Thermodynamics to the Deoxidation of Liquid Steel." He was graduated from Sewanee in 1920 and received his M.S. degree at the University of Iowa in 1922 and his Ph.D. degree at the University of California in 1926. He taught physical chemistry for two years at Illinois Wesleyan, and for three years at Georgia Tech.

E. E. BOLDS, formerly with Ludwig Hommel Co., is organizing a new company with A. A. Anderson, to be known as Anderson-Bolds, Inc., 1836 Euclid Ave., Cleveland. They will represent the American Electric Furnace Co., of Boston. Mr. Bolds is a member of the Cleveland Chapter.

A large batch of new additions to the staff of Battelle Memorial Institute, Columbus, Ohio, includes several Society members.

CARLOS M. HEATH, formerly with American Brass Co., Waterbury, Conn., graduate of Michigan State College, member Detroit Chapter, has been appointed assistant metallurgist at Battelle.

Dr. BRUCE A. ROGERS comes to Battelle from the Bureau of Standards where he conducted a survey of the engineering uses of silver. Prior to that he was with Westinghouse Electric Co., and is well known for his work on magnetic age hardening of iron and high temperature microscopy. The Washington Chapter loses a good man.

CHARLES TURNER GREENIDGE has been research metallurgist for A. O. Smith Corp., Milwaukee, and before that, research engineer for Combustion Engineering Corp.

Fresh from University of Wisconsin, PHILIP C. ROSENTHAL, junior member of the Milwaukee Chapter, has also joined the Battelle metallurgical staff.

WENDELL F. GADDIS, member of St. Louis Chapter, has transferred from the Bureau of Mines at Rolla, Mo., to Illinois Steel Co., where he has the position of pyrometer reader.

York Breaks Attendance Records at Harrisburg

Reported by H. G. Hoch

York Chapter, April 10. — York Chapter closed its most successful season with the annual Harrisburg meeting. After preliminary inspection and routine sampling in the Tap Room, nearly 100 members and guests had dinner at Hotel Harrisburger.

The program was then rudely interrupted by a squabble between Chairman Bill Allen (the tallest man in York) and the photographers from the local papers. It seems that our Bill wanted to be in the picture but the local newshawks complained of plates too small to accommodate extremes. After a compromise was effected and order restored, the Chapter had the pleasure of listening to an after-dinner speech of unusually high calibre by Dr. A. E. Brown, headmaster of the Harrisburg Academy.

The technical speaker of the evening was P. E. McKinney, metallurgist, Bethlehem Steel Co., who spoke on heavy forgings. His talk covered interesting features in the manufacture of forgings, with particular reference to heavy press and hammer forgings, such as for marine work and power plants.

In the discussion Mr. McKinney also covered the subject of mass, and its influence on heat treatment and physical properties.

Other subjects discussed were control of analysis in pouring extremely large ingots, and the wisdom of specifying lower physicals and securing better properties as a result of less drastic treatment, as well as specific questions related to individual difficulties.

St. Louis Chapter Sponsors Course on Heat Treatment

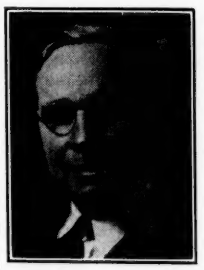
The David Ranken, Jr. School of Mechanical Trades is presenting a short evening course on "Heat Treatment of Steel," sponsored by the St. Louis Chapter of the A.S.M. A special committee of the Society is cooperating in organizing the course, and the instructor will be W. J. Ruby, chairman of the Chapter.

Primarily an elementary course, it consists of lectures and practical demonstrations at the furnace.

The term commenced March 26, and will end June 13, with classes twice a week. Registration fee is $2.00, and the tuition fee $6.00.

ROBERT W. MAYER, graduate of University of Pennsylvania, member of the Society since 1921, has transferred from Detroit to Cincinnati as district manager for Brown Instrument Co. He is also representing Minneapolis-Honeywell Regulator Co.

John J. Crowe, newly elected president of the American Welding society, brings to that office a wealth of experience in association work. In 1920 and again in 1923 he served as chairman of the Philadelphia Chapter of the A. S. M., in 1921 as a director of the Society, and in 1932 as chairman of the New York Chapter. He was a director of the Welding Society from 1924 to 1934, and senior vice-president since 1933.



John J. Crowe

Mr. Crowe's first position was with the Bureau of Standards, where he was largely responsible for the growth of the Pyrometry Division. In 1915 he accepted a position with the Navy Department and, as physical metallurgist, assisted in the establishment of metallurgical laboratories in several of the Navy Yards.

In 1924 he took the position he now holds as engineer in charge of apparatus research and development for the Air Reduction Co.

Marimba Concert and Corrosion Protection Interest 600 in Chgo.

Chicago Chapter, April 11—This meeting marked a high spot in many respects. After expanding the accommodations to take care of 400 at dinner, a number of people had to go elsewhere to eat, but returned to swell the entertainment and lecture attendance to 600.

Claire Omar Musser, musically talented Chicago Chapter member, brought out ten of his 100-piece marimba symphony orchestra for one of their last appearances prior to a European tour. The enthusiastic reception showed that music hath power to still even the savages of A.S.M.

After honorary student memberships had been conferred on 12 selected engineering students, Chairman H. A. Anderson introduced Dr. R. M. Burns, assistant chemical director of Bell Telephone Laboratories, New York. As a national leader in the American Electrochemical Society and other organizations interested in corrosion, and as the director of protection studies for the far-flung American Telephone System, Dr. Burns is eminently qualified to discuss "The Protection of Metals from Corrosion."

In addition to iron and steel, the telephone plant contains most of the nonferrous metals, in nearly 90,000 miles of underground cables, five million miles of open-line wire, and thousands of tons of pole line and manhole hardware. These metals are exposed to arid and humid, hot and cold climates. After treating the mechanism of corrosion and nature of protective films, Dr. Burns discussed the various metallic and organic coatings and methods of testing them.

A forcible cutting-off of active discussion at 10:45 p. m. brought a big meeting to its close.

Heat Treated Low Carbon Iron Has Good Properties

Reported by Howard E. Handy

Boston Chapter, March 8—A family-style dinner, served in Walker Memorial, Massachusetts Institute of Technology, Cambridge, was followed by an educational and entertaining coffee-talk by Edward H. Cooley, executive secretary, Code Committee for the Fishing Industry of New England. The speaker gave many interesting anecdotes as well as statistics about the fishing industry.

The principal speaker was C. H. Morken, Detroit Electric Furnace Co., whose subject was "The Modern Trend in the Manufacture of Cast Iron."

Mr. Morken described the more important physical and metallurgical properties of present-day cast iron and spoke particularly of the excellent results obtained by heat treating the lower carbon cast irons. The talk was illustrated and an interesting discussion followed.

Dr. ERNEST O. OLDS, chairman, Publicity Committee, New Jersey Chapter, has moved to Rochester, N. Y., to become chief chemist of the Shuron Optical Co., Inc. He will be replaced on the New Jersey Publicity Committee by W. R. FRAZER of Eclipse Aviation Corp.

Robert W. Hunt Co., Engineers, Chicago, has accepted the resignation of C. B. Nolte, their president, who has accepted the presidency of Crane Co.

JAMES C. OGDEN, formerly vice-president in charge of the company's eastern and foreign activities at New York, and member of the New York Chapter, A.S.M., will succeed Mr. Nolte as president. Mr. Ogden has been with the organization for 35 years and in an executive capacity since 1908.

The position of vice-president and general manager will be taken by F. M. Randlett, who has been Pacific Coast manager at San Francisco since 1926.

RAYMOND A. CIESIELSKI has recently joined the Chain Belt Co., Milwaukee, working on malleable foundry investigations in the research laboratory.

Short-time Creep Tests Not Always Safe Predictions

Reported by George P. Halliwell

Pittsburgh Chapter, April 11—The April meeting was a high spot in the activities of the local Chapter. Our membership is the highest on record, and to all appearances it looks as if some of the other chapters are going to have a difficult time retaining their hard-won laurels.

We were exceptionally fortunate in having the rare treat of listening to Dr. H. W. Gillett, chief technical advisor to the Battelle Memorial Institute, whose subject was "The Properties of Steels at Elevated Temperatures with Special Reference to Plain Carbon Steels."

Dr. Gillett gave a short review of the work done in developing new steels having low creep values at elevated temperatures, which had permitted the use of high temperatures and stresses in such applications as oil cracking equipment and steam turbines. He emphasized the fact that while the metallurgical profession is amassing a great deal of data on the creep properties of steels, there is still much to be learned.

He also laid great stress upon the effect of steel manufacture, showing an instance where two steels of same composition had widely different temperatures of hardening and creep rate. No short-time creep test has yet been developed which will safely predict the properties over an extended period of time.

Other points brought out and illustrated by Dr. Gillett were: That fine-grained steels have superior creep values at low temperatures, whereas coarse-grained are better at high temperatures, although oxidation mitigates against their use; that annealed steels are better in performance than quenched and tempered; that pearlitic steels are better than spheroidized; and that steels having carbide-forming elements to carry the load at high temperatures are to be desired.

During the discussion the quandary in which the design engineer finds himself was presented. He must design machinery and equipment to operate successfully over a period of years, and yet he does not know the true properties of his alloys. Hence the desire for an accurate short-time test. Several of the members took exception to Dr. Gillett in his recommendation to pass on creep data to engineers as soon as a sufficient amount were available. They seemed to think that it would be a rather dangerous practice, simply because the data were not fully confirmed for an extended period of time and might be used erroneously.

A number of other points were discussed, such as creep recovery under intermittent operation and the rather baffling problem of negative creep.

Story of Steel from Ore To Finished Product Given

Reported by Elam E. Williams

Indianapolis Chapter, April 24—This meeting was dedicated to Mr. M. G. Spencer and E. S. Moore, who passed away during the year. Mr. Richard Wagner of the Electric Steel Casting Co. represented Mr. Spencer, and Mr. Elam E. Williams represented Mr. Moore.

A moving picture was presented at this meeting by Jones & Laughlin Steel Co. It told the story of the manufacture of steel from the iron ore, coal, and limestone through to the finished steel product.

Mr. A. E. Crockett of the Bureau of Instruction very ably explained the manufacture of steel from the ore to the finished product. Especially did we enjoy his fine remarks to the students present in which he urged them to carry on in investigating yet-undiscovered possibilities.

The meeting was adjourned with a rising vote of thanks for the speaker.

Bain Is Speaker at Boston

Reported by Howard E. Handy

Boston Chapter, Jan. 4—Edgar C. Bain, assistant to the vice president, United States Steel Corp., New York, was the principal speaker. His subject was "The Properties of Steel as Controlled by the Mode of Transformation," and the talk was excellently illustrated with numerous slides.

Following a cafeteria supper, an interesting coffee-talk entitled "A European Trip" was given by Leslie D. Hawkridge, vice-president, Hawkridge Brothers Co., and a member of the Boston Chapter. The speaker spent considerable time on the Continent last summer and told of many interesting experiences.

Thermal Conductivity of Tool Steel Is Important

Reported by Paul S. Lane

Baltimore Chapter, April 29—J. P. Gill, vice-president and chief metallurgist, Vanadium-Alloys Steel Co., presented one of the best papers on "Tool Steels" ever given at this Chapter.

The plain carbon steels were first treated, and the treatment and proper applications of each group were discussed in detail. In the alloy steels the effects of the various alloys upon grain size, strength, hardness, were amply illustrated by means of well-prepared lantern slides. Mr. Gill pointed out, however, that the percentage of carbon present largely determines the treatment and application for any particular steel, this element being more potent in its effects than any of the other alloys.

Another interesting sidelight on the life of tool steels is that the thermal conductivity of the steel (which is influenced by composition and heat treatment) appears to be an important factor. In laboratory testing of steels, it is important that the test piece be of such size and shape that results will be comparable to those had in actual production.

The meeting terminated with a lively discussion and many interesting questions by the members.

Properties of welds Affected by Inclusions

Reported by B. R. Queneau

Northwest Chapter, April 26—For the final technical meeting of the year, the Chapter was very fortunate in having Dr. Samuel L. Hoyt as the speaker. The first part of the lecture dealt with the characteristics of arc deposited weld metal.

One of the most interesting points was the relation between the type of inclusions and the properties of the metal. The presence of FeO always indicated that the metal would be structurally abnormal in the McQuaid-Ehn test, soft spots would occur in carburized specimens, and the metal would be hot short. Two methods of determining the type of inclusions were given—first by the use of the polarizing microscope and then by chemical analysis as developed by the A. O. Smith Corp.

The second part of the lecture dealt with a new heat resisting alloy for ultra-high temperatures, also developed by the A. O. Smith Corp. The approximate composition is 38% Cr, 8% Al, balance iron. It was stated that the life of this alloy is ten times that of nickel-chromium alloys at 1850° F. and that its life at 2300° F. is the same as that of nickel-chromium alloys at 1850° F. Many problems have still to be worked out, but that of obtaining a constant aluminum content and of mechanical treatment have been solved.

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Sectional Meeting Planned

A sectional meeting sponsored by the New York Chapter, with the Philadelphia, New Jersey, and Lehigh Valley Chapters participating, has been announced for May 24 at Hotel Pennsylvania, New York City.

The morning session will consist of round table discussion groups on various subjects. A symposium on the role of metals in transportation is planned for the afternoon, to be presented by three nationally known speakers. The evening will be devoted to entertainment, with a stag dinner and gala floor show.

Dr. Sauveur Presents His Theory of Steel Structure

Reported by Scott C. Taylor

Detroit Chapter, April 8—The Detroit Chapter feels highly honored to have had as speaker the "Dean of Metallurgists," Prof. Albert Sauveur. It was also fitting that the technical chairman of the evening was Prof. A. E. White, a past president of the National Society and at one time a pupil under Dr. Sauveur.

The speaker first presented the old ideas of the structure of steel and then presented his theory. He stated that: (*a*) No matter what the treatment, steel may be considered as being composed of ferrite and cementite, (*b*) the physical properties of steel depend on the grain size of the ferrite and the particle size of the cementite, (*c*) the smaller the ferrite the stronger the steel, and the smaller the cementite the harder the steel.

Transformation of martensite may be looked upon as an aging process. Carbon is soluble in gamma iron, and during the quenching or cooling process (in annealing or normalizing) carbon is thrown out in the form of cementite, and the slower the cooling the more cementite is thrown out and the larger the particles.

Cold working hardness is due to a decrease in grain size, and the more the ferrite, the more the hardness can be increased by cold working, whereas hardness by quenching depends on the amount of carbon.

There is no direct means of measuring particle size of cementite. The speaker outlined a method which is substantially the colorimetric method for carbon.

The attendance at this meeting was the largest in the history of the Detroit Chapter.

Three Chapters Meet at Dayton

(Continued from page 1)

mospheres are likely to produce a soft, decarburized skin. The atmospheres finally selected produce a very light scale on the tools, as this is considered less objectionable than a soft skin. Many difficulties were encountered before satisfactory gas-air mixtures were worked out. Published data were of little value, as other investigators had used manufactured gas while natural gas was available in the plant.

Mr. Oliver described a furnace which he has designed and hopes to build at some future time, in which the preheat and hardening operations are combined. This furnace would be of the tubular type in which the tools are charged into the cold end. The temperature would increase as the tool was pushed through the furnace until it reached the quenching temperature at the discharge end. A gas mixture of the correct composition would be introduced into the cold end of the furnace. As it flowed through the tubes, it would crack to give an atmosphere of the correct composition in each zone of the furnace.

The final paper of the session was presented by R. J. Cowan of the Surface Combustion Co. on "The Use of Controlled Atmospheres in Production Heat Treating and Forging." Mr. Cowan discussed some of the reactions which take place in a heat treating furnace on the basis of the system: CO_2-Fe. The relations are complicated and small changes in any one factor may produce profound changes in the steel heat treated.

Considerable progress has been made in the construction of controlled-atmosphere, open-fired furnaces, but perhaps greater attention has been paid to the construction of muffle furnaces in which a special atmosphere suited to the work heat treated is fed into the heating chamber. Mr. Cowan also described the recently developed radiant tube furnace in which the gas-air mixture is burned in diffusion burners and the products of combustion are conducted through tubes which are attached to the walls of the heating chamber.

A dinner meeting was held at 6:30 p.m. F. L. Meecham of the Dayton Chapter acted as toastmaster and introduced the visiting officers who gave brief talks. Dr. Anson Hayes, director of research of the American Rolling Mill Co., gave a talk on "The Use of Metals in Transportation, Communication, and Housing."

At the evening session Dr. V. N. Krivobok of the Allegheny Steel Co. and Carnegie Institute of Technology gave his Campbell Memorial Lecture on "Alloys of Iron and Chromium." This brilliant lecture delivered in Dr. Krivobok's inimitable style was a fitting conclusion to an interesting and instructive meeting.

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Impact, Welding, New Alloy, Show Research Trend

Reported by A. O. Schaefer

Philadelphia Chapter, March 29 — The particular aspects of metallurgical research which Dr. Samuel L. Hoyt of the A. O. Smith Corp. singled out for attention at the March meeting, were impact testing, welding, and a new heat resisting alloy.

Impact testing, the speaker feels, is much maligned because it is not carefully carried out. Notched bar testing would be a better name for it. Bars should be broken under varying conditions, if a true picture of the state of the metal under test is to be had.

Typical curves, drawn with impact value as one ordinate and width of bar, velocity of impact, and temperature as the other, all show a "break," or zone of widely varying results. These breaks in the curves should be located by test results. Readings taken at random, therefore, fail to accomplish the results that can be obtained by the intelligent use of the notched bar test.

The speaker reported the results of considerable investigation of arc deposited weld metal. He has been able to identify non-metallic inclusions by supplementing the usual micro-examination by an inspection under reflected polarized light with crossed Nicols. Transparent material is illuminated, while the rest of the field is black. Such examination checks with remarkable accuracy the results of fractional oxygen determinations by the method of Dr. Reeve.

The conclusions of the investigation demonstrate the superiority of weld metal deposited with a cellulose-covered rod, as compared with a bare or slag-covered rod. There is considerably less FeO in such metal, and the grain size is quite fine, due in part to a "beneficial dispersion" of silicate inclusions.

Dr. Hoyt, several years ago, delivered a paper on Carboloy in Philadelphia. Since that time that material has developed into one of our most useful tools. The speaker hopes that a new alloy, at present called "Ultralloy," will also develop into a broad sphere of usefulness. The analysis is 37.5% chromium, 7.5% aluminum, balance iron. The speaker envisages furnaces for hardening high speed steel, forging furnaces, and even pot-type electric melting furnaces, equipped with this alloy.

The dinner preceding the meeting was addressed by Dr. Julius Bernstein, a distinguished amateur meteorologist, who exposed some well-known weather superstitions. Our weather is not changing and winters are as severe as ever. The Gulf Stream has no effect on the climate of the eastern United States.

A.W.S. Joint Meeting Features Hard Facing

Reported by C. W. Horack

Golden Gate Chapter, March 18—The March meeting was held in Oakland as a joint meeting with the San Francisco Section of the American Welding Society.

The first technical talk was given by R. E. Brown, Pacific Coast representative of Electro Metallurgical Sales Corp., on "Hard Facing Metals, Their Properties and Uses." He considered first the classes of alloys used in hard facing, and then the selection of a suitable rod for various types of work. Both the oxy-acetylene and electric arc methods of applying hard facing materials were discussed. The speaker amplified his remarks by a series of illustrations of surface-hardened jobs.

The members were then given an opportunity to see what happens when austenite changes to martensite. This was made possible through the courtesy of R. L. Dowdell, professor of metallography at the University of Minnesota, who permitted the Chapter to run his motion picture film showing the formation of the characteristic needle-like structure of martensite.

New Jersey's 1935 Metallurgy Class

The most interesting and educational course that has yet been given—that is what the group in the photograph thought about New Jersey's 1935 class, just completed.

This was the 8-lecture course in metallurgy prepared by A. Allen Bates of Case School of Applied Science, Cleveland. It was presented in New Jersey by W. R. Frazer of Eclipse Aviation Corp., past chairman of the Chapter. His presentation aroused great enthusiasm.

Average attendance at the lectures was 98.

Nitrogen in Cases From Liquid Baths Is Disputed

Reported by F. G. Anderson

Rockford Chapter, March 13—W. M. Gager of the E. I. DuPont de Nemours Co. spoke at the March meeting on "Sodium Cyanide."

Besides a complete description of the manufacture and applications of sodium cyanide, accelerated hardening baths were also discussed. Mr. Gager definitely stated that all liquid hardening baths produce cases which contain nitrogen. This statement excited lively discussion. The presence of alkaline earth metals, particularly calcium, produces accelerated baths.

Numerous lantern slides illustrating results of extended research work on analysis and structure of cases formed a large part of Mr. Gager's presentation.

Alloy Elements Classified

Reported by L. E. Raymond

New Haven Chapter, March 21—The Chapter was addressed by Dr. A. B. Kinzel of Union Carbide and Carbon Research Laboratories on the subject of "Alloys in Steels."

The entire field of alloying elements was divided into three classes, the carbide-forming elements, the austenite-forming elements, and the deoxidizing elements. The necessity of maintaining a proper balance of each type, and some of the results which have been obtained in the machinery, engineering, and tool steel fields were shown.

Smith-Emery Celebrates 25 Years in Los Angeles

The firm of Smith-Emery Co., industrial chemists and engineers, is celebrating the completion of its 25th year of continuous operation in Los Angeles.

Established in 1910 with a staff of but four members, this company has gradually enlarged the scope of its activities in pace with the industrial growth of Southern California.

Smith-Emery Co. has representatives at San Francisco, Portland, and Seattle, and is associated with the Pittsburgh Testing Laboratory.

Cleveland Charter Member Dies

From Cuyahoga Steel & Wire Co. comes an announcement of the death of A. M. LeTellier, vice-president and general manager. Mr. LeTellier has been a member of the Cleveland Chapter since 1919.

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New Type of Diesel Engine Is Started with Carburetor

Chicago Chapter, April 26—After a dinner at the Stock Yard Inn, C. B. Jahnke, research engineer for the International Harvester Co., described and illustrated a modern development of Diesel engines for truck and heavy tractor operation.

This engine differs from the usual design of Diesels in that it is started with a carburetor as an ordinary gasoline motor, and is later converted to a higher compression oil-burning Diesel engine after the temperature of the motor becomes high enough to support combustion of the fuel upon injection. A further feature of the recent development is decreased vibration and elimination of knocking by pre-chamber combustion.

The members were conducted on a brief trip through the Tractor Works in the afternoon.

Cleveland Chapter Visits Modern Plant

Reported by Gordon T. Williams

Cleveland Chapter, April 1—National Officers' Night was observed at the April meeting with present and past officers Ben Shepherd, Emil Gathmann, Bill Eisenman, Bob Archer, Bill Woodside, Joe Emmons, and Bill Bidle, seated at the speakers' table. This annual event has never before brought such an imposing array of distinguished guests. All were introduced and made brief talks regarding the affairs of the Society—that is, all but our national secretary, whose libelous anecdotes were presented in his usual elegant manner.

The evening meeting was preceded by an afternoon inspection trip through the fine, modern plant of Cleveland Graphite Bronze Co. All were impressed by the excellent working conditions and provisions for comfort and well-being of workmen.

The president of the company, Mr. Ben Hopkins, explained at the evening meeting the plan and ideals which are worked out so effectively in their plant. Employee comfort and health, they find, result in better work and better labor relations.

The evening address was presented by E. R. Darby of the Federal Mogul Corp., on the subject of "Bearing Metals." His fine summary of bearing metals today has already been reported in these columns. This chapter found the talk interesting and stimulating as have others.

Harry P. Croft of Chase Brass & Copper Co., presided as technical chairman and 150 members and guests were present.

The nominating committee, with K. R. Van Horn as chairman and W. E. Benninghoff and W. S. Bidle, reported the following slate—Chairman, H. B. Pulsifer; Vice Chairman, H. P. Croft; Secy.-Treas., G. T. Williams; Executive Committee, E. F. Ross, E. F. Burke, A. M. Thurston, H. D. Churchill, A. A. Bates, J. C. Beattie, A. H. Allen, G. C. Beebe, H. E. Brown, H. B. Jordan. This slate was unanimously elected.

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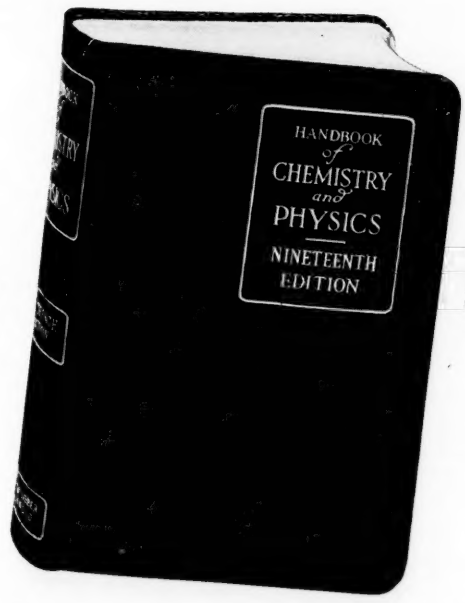

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Tantalum Carbide Tools Free From Crater Effect

Reported by Richard R. Kennedy

Dayton Chapter, March 12—The speaker was Philip McKenna, research metallurgist of the Vanadium-Alloys Steel Corp., who delivered a talk on "Recent Developments in Bonded Carbide Tools."

Mr. McKenna described the process used in making tungsten carbide tools. These tools have proved very desirable for machining a variety of substances, especially brass, cast iron, and bakelite.

One difficulty often encountered in machining steel with tungsten carbide is the failure of the cutting edge due to "crater effect." The chips, in striking the tool just back of the cutting edge, gradually wear a small depression, or crater, which eventually chips out. Tantalum carbide tools, a development of the last five years, are free from crater effect and thus are finding wide utility in machining steel.

This material is made by heating a mixture of tungsten carbide, tantalum, and nickel or cobalt. Tantalum carbide and metallic tungsten are formed. The nickel or cobalt acts as a binder. Tantalum carbide has a hardness comparable with that of tungsten carbide, a density of 14.5, and a melting point of 3875° C., the highest of any known chemical compound.

Tools are made by brazing a tip of the bonded carbide material to a steel shank. They are finished by grinding with special silicon carbide wheels or the newly developed diamond wheels.

Mr. McKenna cited a number of interesting applications of tantalum carbide tools in machining hard materials and conventional materials at very high speeds.

Booklet on Air Conditioning

Anyone interested may have a copy of a new bulletin which has just been issued on the application of electrical thermometers to the "Efficient Regulation of an Air-Conditioning System."

This well-illustrated, 24-page booklet tells the owner, the architect, the engineer and the contractor what each needs to know about electrical thermometers. It may be had by asking Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, for bulletin 4001.

Vanick Repeats Lecture on Cast Iron for Montreal

Reported by Gordon Sproule

Montreal Chapter, April 1—The April meeting started with the usual dinner and an excellent film talk by Canadian General Electric Co. on "Illumination." The four requirements are: (a) Enough light, (b) no glare, (c) correct contrast, (d) enough lamps.

The technical address was delivered by James S. (Jim) Vanick of the International Nickel Co., and reviewed for members the methods for producing strong, and, more particularly, hard cast iron. As this address has been given before several other chapters, and as the International Nickel Co. has for distribution an excellent series of bulletins on the subject, it will not be reported here.

Mr. Vanick referred to the increased use of molybdenum in cast iron in the past five years, and his generosity in this respect was commented on by W. M. Goodwin in proposing the vote of thanks. The time seems to be past when the proponent of an alloy feels he has to talk as though his were the only useful element.

Penn State Announces Co-op Research Program

Penn State's Department of Metallurgy announces a cooperative research program supported jointly by Allegheny Steel Co., Carpenter Steel Co., Heppenstall Co., Latrobe Electric Steel Co., Vanadium-Alloys Steel Co., Bethlehem Steel Corp., and Republic Steel Corp.

Close technical contact is being maintained with company representatives to insure that the investigations undertaken shall have a definite practical aspect. The program so far covers the effects of stress and corrosion on alloys at elevated temperatures, and factors affecting the decarburization of steel.

The project was started last September under the direction of Dr. Charles R. Austin. High temperature deformation equipment especially designed for work of this kind has been loaned to the School by the Westinghouse Electric and Mfg. Co. A recording potentiometer has been loaned by the Pittsburgh Experiment Station, U. S. Bureau of Mines.

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Nickel Silver
Seymour Mfg. Co. has an interesting new folder which gives the complete story of nickel silver—its historical background, preferred composition, applications, shapes available, and modern method of manufacture. Bulletin Ax-48.

Metallographic Equipment
A bakelite press for mounting specimens, grinders, polishers, and microscopes are described in an issue of "Waco Service," a publication of Wilkens-Anderson Co., who deal in laboratory supplies. Bulletin R-139.

Burners and Valves
Auxiliary equipment for industrial furnaces that will insure proper heat production and correct combustion, such as oil and gas burners, blowers, regulating and shut-off valves, is fully described in Mahr Mfg. Co.'s illustrated booklet. Bulletin Jyx-5.

Resistance Alloys
C. O. Jelliff Mfg. Corp. has a booklet packed full of information on electric resistance alloys. In addition to a full catalog of their own materials (properties and recommended sizes and lengths given), it contains information on design of resistance elements and the resistance properties of other materials. Bulletin R-141.

Nickel-Molybdenum Alloys
A reprint from *Steel* on nickel-molybdenum cast alloys (trade name Cecolloy) is published by Chambersburg Engineering Co. Bulletin R-142.

Foundry Ovens
Gehnrich Corp. gives a complete description of the various types of ovens for core baking, mold drying, low temperature heat treating, and japanning in Bulletin R-143.

Stainless 18-8
Firth-Sterling Steel Co. has just issued a new folder giving physical properties and working data on four types of Nirosta 18-8 analyses. Bulletin R-144.

Oil Burner
Accurate, simple, and foolproof is the automatic DI oil burner made by R-S Products Corp. Read more about it in their folder giving all details. Bulletin R-145.

Die Steels
Darwin & Milner has two folders on their "Neor" non-deforming high carbon chromium steel and "Patent Cobaltchrome" steel for dies. Properties, applications, and detailed instructions for treatment are given. Bulletin R-127.

Batch Carburizing
Actual operating data on clutch parts and bearing races and cones are given in Surface Combustion's folder on gas carburizing in horizontal batch type units using the Eutectrol process. Bulletin Myx-51.

Centrifugal Compressors
B. F. Sturtevant Co. has a line of centrifugal compressors designed particularly for industrial furnace applications. These are illustrated and described in Bulletin Myx-58.

Low-Cost Controller
Leeds & Northrup has a new low-cost Micromax controller for use where simple "on-off" control is adequate without indication or record, and where first cost must be low. Described in Bulletin Myx-46.

Multi-Color Records
A handsome booklet describing Foxboro's multi-color potentiometer recorder for 2, 3, 4, or 6 temperatures reproduces charts in actual color. Specifications for one model are given. Bulletin Myx-21.

Tacks and Nails
Cut tacks and small cut nails (Grand Crossing Quality) of all types and for all uses are catalogued in Republic Steel Corp.'s latest booklet. An index is provided for handy reference. Bulletin Myx-8.

Welding Electrodes
Electrodes for welding alloy steel, particularly "Cor-ten" steel, used for railroad cars and outdoor structures, are described in Metal & Thermit's new booklet. Bulletin Myx-64.

Misco Alloys
Compositions, properties, and applications of Misco stainless, heat, and corrosion resisting castings are given in an illustrated folder offered by a pioneer producer, Michigan Steel Castings Co. Bulletin Mx-84.

Welding Design
Valuable technical information on the design of such parts as wheels, levers, bosses, and machinery bases for arc welded steel construction is contained in a series of "Application Sheets" issued by Lincoln Electric Co. Bulletin Myx-10.

Sheffield Steels
Wm. Jessop & Sons, Inc., have a leaflet which tells why a special anneal and a proper balancing of carbon, manganese and tungsten combine to make Sheffield Superior oil hardening steel non-distorting and easily machinable. Bulletin Jn-61.

Non-Ferrous Annealing
General Electric Co. describes bell-type furnaces for annealing non-ferrous metals in a new folder which gives many data on operation and performance. Description is from technical rather than sales angles. Bulletin Ar-60.

Oxwelding Stainless
Linde Air Products Co. has published a handbook of instructions for successfully welding corrosion resisting steels by the oxy-acetylene process. Welding procedures and weld treatments are carefully explained. Bulletin Jy-63.

Rockwell Tester
The Rockwell Superficial Hardness Tester is applicable to far thinner sheet and strip than the regular Rockwell. Its use for nitrided and case hardened parts is also described by Wilson Mechanical Instrument Co. in Bulletin Myx-22.

Beryllium-Copper
Beryllium-Copper, produced by American Brass Co., can be heat treated to tensiles as high as 181,000 lb. per sq.in. It comes in sheets, wire, rods, tubes and forgings. A fine booklet tells how to fabricate and heat treat. Bulletin No-89.

Aluminum Alloys
Working facts on aluminum—the properties and heat treatment of both cast and wrought alloys—are briefed for the manufacturer and designer in a booklet by Aluminum Co. of America. An appendix gives tables of physical properties, forms and sizes available. Bulletin Dc-54.

Free Cutting Steel
Jones & Laughlin Steel Corp. has published in attractive booklet form a record of 15 years of research by their metallurgical department into the machinability of free cutting steels. Bulletin Ob-50.

High Strength Steel
Cromansil steel, a development of Electro Metallurgical Co., has high strength and good ductility "as rolled" and is thus fine for structural applications where its great strength saves much dead weight. Bulletin Je-16.

Carbonol Process
The Carbonol process of carburizing is described in detail in a folder of Hevi Duty Electric Co. Results are said to be quicker, cleaner and better cases at very low cost. Bulletin Jy-44.

Cast Vanadium Steel
Jerome Strauss and George L. Norris have written a technical booklet for Vanadium Corp. of America describing the properties developed by steel castings containing various percentages of vanadium. Bulletin S-27.

Pyrometer Accuracy
A thought-provoking folder of Hoskins Mfg. Company explains how the use of Chromel-Alumel for pyrometer lead-wires makes it possible to take full advantage of modern pyrometric instruments. Bulletin Ob-24.

Hardening Furnaces
The C. I. Hayes Certain Curtain electric furnace for the range 1200 to 1850° F. is described in this bulletin. Its applications to hardening of carbon, stainless, and alloy tool steels and to preheating high speed steel are discussed. Bulletin Nv-15.

Photocell Pyrometers
Recording potentiometers using a beam of light, a mirror galvanometer, and a photo-electric cell give instantaneous control with high sensitivity and accuracy. The different varieties made by C. J. Tagliabue Mfg. Co. are described in a 16-page letter-size booklet. Bulletin Fx-62.

Dark Room Layout
A novel card 9½x13 in. containing suggested arrangements for a photomicrographic dark room has been designed by Bausch & Lomb. Costs for installation are estimated, and on the reverse side are printed rules for using the dark room. Bulletin Jx-35.

Neophot
"Neophot" is the name of a new metallograph of radically new design and universal adaptability. A pamphlet distributed by Carl Zeiss, Inc., gives its applications and features and is well illustrated with beautiful samples of micrographic work. Bulletin Jx-28.

Testing with Monotron
Shore Instrument & Mfg. Co. offers a new bulletin on Monotron hardness testing machines which function quickly and accurately under all conditions of practice. Bulletin Je-33.

Turbo-Compressors
The new items in Spencer Turbine Co.'s bulletin are a new and smaller "Midget" turbo for individual mounting, a single-stage line which effects new economies, and the gas-tight turbos for acid and explosive gases. Bulletin Mx-70.

Alloy Castings
Compositions, properties, and uses of the high nickel-chromium castings made by The Electro Alloys Co. for heat, corrosion and abrasion resistance are concisely stated in a handy illustrated booklet. Bulletin Fx-32.

Radium Radiography
Advantages of portability, ease of application and manipulation in examination of castings, forgings, molds, weldings, and assemblies are attributed to radium for industrial radiography. Details are given in a booklet issued by Radon Co. Bulletin Jx-56.

Steels for Automobiles
The story of "Cold Finished Steel and the Automobile" is very interestingly told by Union Drawn Steel Co. Improvements in automotive design are reflected in improvements in cold drawn steels, the advantages of which are now available to many other industries. Bulletin Ax-83.

Liquid Carburizing
E. F. Houghton's Perliton liquid carburizer is the subject of a 23-page booklet. Depth of case, speed of penetration, and other results are well illustrated with graphs and photomicrographs. Bulletin Nv-38.

Controlled Steels
Carnegie Steel Co. has published a very interesting booklet which describes in some detail the process control used in the production of uniform steels. Bulletin Je-85.

Big-End-Up
Gathmann Engineering Co. briefly explains the advantages of steel cast in big-end-up ingots, showing the freedom from pipe, excessive segregation and axial porosity. An 82% ingot-to-bloom yield of sound steel is usual. Bulletin Fe-13.

Bright Annealing
Electric Furnace Co. tells about their controlled atmosphere furnaces for continuous deoxidize annealing, bright normalizing and annealing ferrous and non-ferrous metals. Work comes clean, bright and dry from these furnaces. Bulletin No-30.

Moly Matrix
Climax Molybdenum Co.'s little monthly newspaper contains many interesting and informative articles. Get the latest issue by asking for Bulletin Ax-4.

Blast Cleaning
A centrifugal machine which cleans castings without the use of compressed air is the subject of Pangborn Corporation's new folder. How and why 1800 lb. of castings can be cleaned in 8 min. at low cost is told. Bulletin Jx-68.

Manual of Pyrometry
Brown Instrument Co. offers an elaborate manual which describes the 50 exclusive features of their potentiometer pyrometer. The book will greatly interest those who must maintain accurate temperature. Bulletin Jr-3.

Tempering Furnace
Technical details and operating data on Lindberg Steel Treating Co.'s new Cyclone electric tempering furnace, which has shown a remarkable performance record in steel treating operations, are given in Bulletin Fx-66.

Metallograph
A new 36-page booklet of E. Leitz, Inc., contains all information on the Leitz large Micro-Metallograph MM1. Excellent photomicrographs are reproduced to show its capacity. Special attention is given to the darkfield illumination feature. Bulletin Se-47.

Heat Resisting Alloys
Authoritative information on alloy castings, especially the chromium-nickel and straight chromium alloys manufactured by General Alloys Co. to resist corrosion and high temperatures, is contained in Bulletin D-17.

Recuperators
Results obtained with Carborundum Company's recuperators using Carbofrax tubes are fuel savings, closer temperature control, faster heating, and improved furnace atmosphere. Complete engineering data regarding application to various types of furnaces are given in Bulletin Fx-57.

Carburizing Boxes
Driver-Harris Co. devotes a folder to Nichrome cast carburizing boxes. Physical properties at room temperature and under operating conditions are given, as are the advantages of Nichrome castings for such service. Bulletin Jr-19.

Tubing Weight Tables
Timken Steel & Tube Co. has issued a series of "Master Weight Tables" for round steel tubing, on letter size heavy paper, punched for binding. Weights per lineal foot of length are given for all sizes of hot finished and cold drawn tubing. Bulletin Mx-71.

Heat Treating Machine
A new continuous machine for atmosphere heat treating is covered by an American Gas Furnace Co. bulletin. A variety of treatments may be performed by passing different atmospheres through the muffle. Description is complete and interesting. Bulletin Jr-11.

Heat Treating Manual
A folder of Chicago Flexible Shaft Co. contains conveniently arranged information on heat treating equipment for schools, laboratories and shops, and also illustrates the several types of Stewart industrial furnaces. Bulletin Ar-49.

The Review,
7016 Euclid Ave., Cleveland

Please have sent to me without charge or obligation the following literature described in the May issue. (Please order by number only.)

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Name .....

Position .....

Firm .....

Address .....

A.S.M. National Affairs And PF Characteristic Discussed by President

Reported by E. W. Moore

Rochester Chapter, April 8—Several of Rochester's prominent businessmen, representing the Sustaining Membership, attended the dinner in honor of Mr. B. F. Shepherd, our national president. It was learned with deep regret and disappointment that National Secretary "Bill" Eisenman was unable to attend.

It was a pleasure on our first meeting with Mr. Shepherd to find him the rugged, entertaining, and talented type of man that always graces the chair of the A.S.M. He spoke at length on the conditions, functions, and aspirations of the National Society, and explained the correlation with the activities of the local chapters.

For the main speech of the evening, Mr. Shepherd talked on the PF characteristic of steel, which has already been reported in THE REVIEW. Since it was necessary for him to catch a nine o'clock train, Howard Stagg of Crucible Steel Co. of America volunteered to answer questions during the discussion period.

O. H. Marshall asked whether or not the steel companies were advising their representatives to sell steel based on PF characteristic values. E. S. Roscoe wanted to know to what extent the mill could control the PF characteristics. James Nolan of Carpenter Steel Co., commented on the mills' attitude toward PF phenomena and the mills' obligation to the customer.

Henry W. Thomsen of Burke Steel Co. led a discussion on the crucible versus the electric furnace process of making steel and the effect on the PF characteristics. Mr. Lenhardt of Ritter Dental Mfg. Co. questioned the speaker with reference to the value of PF characteristic to the toolmaker.

Vendors Cooperate in Navy Specifications

Reported by W. R. Frazer

New Jersey Chapter, April 8—The speaker of the evening was Lt. W. S. Kurtz, Construction Corps, U. S. Navy, New York District, who spoke on "Metals of Construction in the United States Navy." Two reels of talking pictures depicting Fleet operations were followed by an address covering the many Naval Material specifications.

He explained that prior to issuing formal specifications, the Navy Bureau of Engineering calls a meeting of various vendors to discuss the material in question and after this conference, a "tentative" specification is drawn up and used in the initial procurement of materials. After the "tentative" specification has been in effect for sufficient time to give the vendors a chance to manufacture to the specification and bring up any details which cannot be met, the Bureau of Engineering then issues the "final" specification.

In the interest of weight saving the Bureau has adopted fabricated welded design to replace heavier castings wherever practicable. They have also carried on extensive investigations in the use of corrosion resisting steels, but the results so far have not been as satisfactory as they had anticipated.

Lt. Kurtz's paper was well received and we can heartily recommend it to other chapters.

WANTED
Machinery and Equipment

Alloy or steel carburizing boxes, round, square, or rectangular for automobile transmission gears.
One Rockwell hardness tester with C scale, Model 3 M or 4 M.
One mechanical carburizing compound sifter.
One power straightening or forcing press, about 25 tons capacity.
Steel tote boxes, steel cabinets, steel letter files and parcel post scales.
We have some Wilson-Maeulen pyrometer equipment to sell.

Address Box 5-2

American Society *for* Metals
7016 Euclid Ave. Cleveland, Ohio

Metallurgical Labs Now Use Beer Tasters!

Reported by Paul S. Lane

Baltimore Chapter, March 20 — "HELP WANTED — For Laboratory Tests, Four Good Beer Tasters. Only men competent to judge slight differences in quality need apply."

In this practical manner did Mr. B. H. McGar, research engineer, Chase Brass & Copper Co., Waterbury, Conn., substantiate laboratory tests on corrosive properties of beer on coils of various alloys. Though tin coils are widely used, it has been found that this metal tends to make beer cloudy and give it a metallic taste, which is eliminated by copper coils. This was just one phase of Mr. McGar's discussion on the use of metals in the beverage industry.

The attack of various fruit juices, both plain and alcohol-blended, on plated metals such as chromium, nickel, and tin, was studied. Since repeal a great deal of ferrous and non-ferrous metal is being used in beverage manufacturing plants as well as in the home.

In testing corrosive qualities of various liquids, Mr. McGar cautioned against using synthetic solutions except as a guide.

Vats, piping, stills, coils, and kegs all are being made from various alloys designed to resist the particular service conditions under which they will operate. From distillery to bar, metals are being used more and more in the beverage field, where their longevity and decorative possibilities have been well received.

DeVries of Ludlum Tells About Stainless Metallurgy

Reported by E. W. Moore

Rochester Chapter, March 11—After having dinner, we were treated to a most delightful and fruitful talk on "The Metallurgy of Stainless Steel" by Ralph DeVries, director of research, Ludlum Steel Co., Watervliet, N. Y.

Mr. DeVries is a graduate of the University of Michigan and has been in the Engineering Department of the Bureau of Standards, and metallurgist for the Barber-Colman Co. He has been closely associated with the earliest metallurgical developments in the various stainless and high alloy heat resisting steels.

The Annual Bowling Party held on March 22 was a great success, and a good time was had by all.

Corrosion Problem Studied

Reported by L. E. Raymond

New Haven Chapter, April 18—Dr. F. N. Speller, director of research of the National Tube Co., spoke on the problem of corrosion, which he has studied extensively.

This has already been reported in THE REVIEW, but it was of interest to note that Dr. Speller considers New England soil not highly corrosive as far as pipe lines are concerned.

Dr. D. K. Crampton, metallurgist, The Chase Companies, introduced the speaker and presided as chairman. After the technical session each member of the Chapter was presented with a bound, mimeographed copy of the educational course recently completed.

Firms Taking Space at National Metal Congress

(Continued from page 1)

Great Lakes Steel Corp., Grob Brothers.

Hardinge Brothers, Harnischfeger Corp., Hauck Mfg. Co., C. I. Hayes, Inc., Heat Treating & Forging, Hevi Duty Electric Co., Hobart Brothers Co., Hollup Corp., Hoskins Mfg. Co., E. F. Houghton & Co., Halcomb Steel Co., Haynes-Stellite Co.

Illinois Steel Co., Illinois Testing Laboratories, International Nickel Co., Iron Age, Jones & Laughlin Steel Corp., Johns-Manville Co.

J. W. Kelley Co., Kelley-Koett Mfg. Co., Kloster Steel Corp., Leeds & Northrup Co., E. Leitz, Inc., Lincoln Electric Co., Lindberg Steel Treating Co., Ludlum Steel Co., Linde Air Products Co.

Machinery, Macklin Co., Magnaflux Corp., Manhattan Rubber Mfg. Co., Marburg Brothers, Metal & Thermit Corp., Metallizing Co. of America, Michiana Products Corp., Michigan Steel Casting Co., Michigan Tool Co., A. Milne & Co., Minneapolis-Honeywell Regulator Co., Molybdenum Corp. of America.

National Industrial Publishing Co., National Tube Co., New Jersey Zinc Sales, Norton Co.

Oakite Products, Inc., Tinius Olsen Testing Machine Co., Page Steel & Wire Division of American Chain Co., Park Chemical Co., Parker-Kalon Corp., Pilbrico Jointless Firebrick Co.

Radon Co., Inc., Republic Steel Corp., John A. Roebling's Sons Co., Joseph T. Ryerson & Son.

Sivyer Steel Casting Co., Spencer Turbine Co., Steel, Steel City Testing Laboratory, Steel & Tubes, Inc., N. A. Strand & Co., D. A. Stuart & Co., Sutton Engineering Co., South Bend Lathe Works.

C. J. Tagliabue Mfg Co., Thomas Steel Co., Timken Roller Bearing Co., Titanium Alloy Mfg. Co.

Udylite Co., Una Welding, Inc., United States Steel Corp., Union Carbide Co., Vanadium-Alloys Steel Co., Vanadium Corp. of America, Victor Saw Works, Inc.

The Welding Engineer, Wesley Steel Treating Co., Westinghouse Electric & Mfg. Co., Wheelock, Lovejoy & Co., Wickwire Spencer Steel Co., Wilkens-Anderson Co., Youngstown Sheet & Tube Co., Ziv Steel & Wire Co.

Railways Following Airways In Use of the Lighter Alloys

Reported by Elam E. Williams

Indianapolis Chapter, March 11—A joint meeting with the Indiana Section of the Society of Automotive Engineers attracted 200 attendants.

Few engineers are qualified to address such a joint meeting and rivet the attention of men of both societies from the first word, but G. D. Welty of the Aluminum Co. of America was more than equal to it. Welty is a key man in the development and design of automotive chassis and power plants employing light alloys, and has been connected with the Aluminum Co. for more than 15 years.

He very ably brought out the fact that railways are fast following airways in using almost entirely light alloys.

Graduate Positions Open

The Carnegie Institute of Technology announces that there will be available for the coming academic year two teaching assistantships and one fellowship in the graduate department of metallurgy. These may be held by candidates for advanced degrees.

Candidates should communicate immediately with Prof. O. T. Geckeler, Secretary of the Committee on Graduate Instruction, Carnegie Institute of Technology, Pittsburgh.

Honorary Memberships Given Chicago Students

An experiment designed to widen the usefulness of the Society and open to it a large, new field of membership was initiated at the Chicago Chapter April meeting when honorary student memberships were conferred on 12 upperclass engineering students from institutions in the Chicago area.

The awards were made on the recommendations of the Student Award Committee of the Chapter and the metallurgical faculties of the various schools.

Those who received the memberships were Richard D. Armsbury, Phillip J. Henoch, and Elmer P. Renstrom, Jr., of Armour Institute of Technology; Orville C. Nutter and Joseph F. Wudi of Lewis Institute; Frank W. Hanson and Henry Schauffler of Northwestern University; Paul Gallagher, John W. Luce, and Leslie Silverman of the University of Illinois; and Elmer Haase and Donald S. Reitz of Valparaiso University.

In presenting the memberships, R. S. Archer warned the students that they were not to consider their awards so much as honors for past performances as opportunities for future development in their profession. He pointed out that the A.S.M. has been built upon the interchange of ideas between members, and invited the students to these discussions.

Hardness of Martensite And Age Hardening Are Still Unsolved Questions

Reported by George P. Halliwell

Pittsburgh Chapter, May 6—The third joint meeting of the season with the Pittsburgh Science of Metals Club was a big success, and a large crowd turned out to listen to Dr. Zay Jeffries on "Some Unexplained Metallurgical Phenomena."

Beginning with Hadfield's original work on non-magnetic manganese steels, Dr. Jeffries cited other metallurgical phenomena, such as the effect of silicon on certain magnetic properties of steel; the effect of other elements in the high speed steel of today, and the working, recrystallization, and grain growth phenomena of tungsten.

The old question of what causes the hardness of martensite is still unsolved. The discovery of tetragonal martensite some years ago by Dr. Fink, member of the local chapter, has helped considerably in supplying a possible explanation. Dr. Jeffries, however, called attention to the very high scratch hardnesses corresponding to 400 and 700 Brinell, obtained by Dr. Rawdon of the Bureau of Standards some time ago on small fused beads of iron containing 0.02 and 0.07% carbon.

Age hardening also came in for its full share of discussion. Dr. Jeffries paid high tribute to the original theory of Merica, Waltenberg, and Scott, which upset the physicists' idea that the most finely divided state (i. e., solid solution) was the hardest and of minimum electrical conductivity. Whereas Sachs in Germany showed that age hardening was obtained with no change in lattice parameter and hence concluded that no precipitate was formed and that the old theory of age hardening was wrong, Drs. Fink and Smith of the Aluminum Co. of America have recently obtained visible precipitation on age hardening with no lattice parameter change. Thus, the whole subject of the cause of age hardening is wide open again.

In conclusion, Dr. Jeffries warned against the extensive extrapolation of data, and made a plea for investigators to summarize their results and attempt to make some explanation, even though it might not be conventional for the present time.

Navy Uses Much Stainless

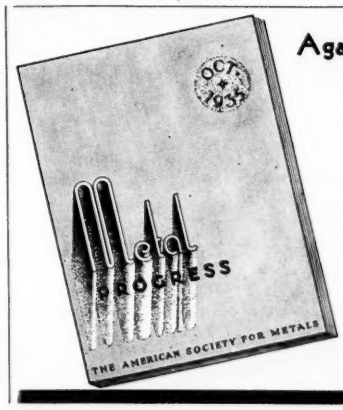
The United States Navy ranks at the top of the list of consumers of stainless steel, according to the American Iron & Steel Institute.

Weight limitation programs are assisted by stainless steel because maximum strength can be obtained with a minimum amount of material, since it is not necessary to increase the thickness of parts to provide for rusting.

Nine different types of stainless are used, not only for strength and weight saving, but for numerous smaller fittings and parts.

New Cutting Oils Announced

A new series of straight cutting oils, combining refrigeration and high film strength, has just been announced by E. F. Houghton & Co., 240 W. Somerset St., Philadelphia. A new folder describing these oils in greater detail is available by writing E. F. Houghton & Co.



Again . . .

A proven success in 1934, the October METAL PROGRESS will again be the National Metal Congress issue . . . Again it will be *ten magazines in one* . . . Advertise to *your own* market in this big issue.

Workability of Wrought Brass Leads to Questions on Cu Recrystallization

Reported by George P. Halliwell

Pittsburgh Chapter, March 14 — C. Edward Keck was "coffee talker"; his subject "Pittsburgh." We all learned a few facts about our home town that perhaps had not appealed to us before.

It is our custom to devote one meeting to the non-ferrous field, and John L. Christie, metallurgist for Bridgeport Brass Co. was the guest speaker on "Some Practical Aspects of Brass." Mr. Christie's talk was confined entirely to wrought brasses such as are used for sheet, rods, tubes, and in spinning, drawing, pressing, and automatic machinery operations.

Alpha brasses containing 63 to 66% copper are used in cold working operations, whereas the hot working alloys, known as beta brasses, contain about 60% copper. The alloy composition specified is often a compromise between the original hot working properties and the final cold working and machining properties. A number of slides were shown illustrating the relative workability of alpha and beta brasses at various temperatures.

During the discussion, considerable attention was given to the recrystallization of copper and brass following hot working or cold working and annealing. Annealing curves shown by Mr. Christie indicate that contrary to what might be expected, oxygen-free high conductivity copper (OFHC brand) softens at a higher temperature than tough pitch copper if the former is of high purity. Mr. Scott of Westinghouse suggested that because no oxygen was present, all impurities would be in solid solution and hence would raise the temperature of recrystallization.

It is difficult for this reporter to reconcile A.S.T.M. specifications as to total impurity content with high electrical conductivity and high temperature of recrystallization. It would seem that the amount of impurity present, silver excepted, necessary to raise the recrystallization temperature to the value shown on the slides would also lower the electrical conductivity to a value too low to be used for high conductivity work.

Silicon Carbide Can Be Used up to 3000° F.

Reported by John W. McBean

Ontario Chapter, April 5—It was announced at this meeting that largely as a result of the lecture course there had been an addition of nearly 60 members to the Chapter.

The paper of the evening was given by J. A. King of the Carborundum Co. He took up "Specialized Refractories," especially the electrically fused forms.

In the silicon carbide and electrically fused alumina group we have materials which can stand temperatures of 2000 to 3000° F. without distortion under load, which resist abrasion and scouring action of both flames and solids, and which have a low spalling loss.

The thermal conductivity of silicon carbide is about ten times that of firebrick, and of fused alumina about four times. This, together with its heat resisting properties, makes silicon carbide especially valuable for the floors of semi-muffle furnaces, for combustion chambers, for indirect heating, and for regenerator tubes. The speaker also warned against the use of silicon carbide in connection with alloys containing more than 3% lead.

Fused magnesite, sillimanite, and mullite were taken up and also the high temperature insulating refractories made from high grade kaolin, yeast, and sawdust, which gives a porous product with high insulating value. These also show little shrinkage and have four times the insulating value of firebrick. They make an ideal material for the outside of furnaces.

A series of excellent slides illustrated the manufacture and uses of these refractories.

Mysterious Element Revealed— Opens New Future for Steel

Reported by G. Sproule

Montreal Chapter, March 4—March meeting of Montreal Chapter was called "Mystery Night." After the usual dinner and some entertaining films, members and guests learned something of Oriental Mysticism, and of the metallurgical advances made in Mongolia while we occidentals were chasing our dinners in the forests.

In the unfortunate absence of Dr. Hum Too Long due to yellow fever, his disciple and assistant, Herr Prof. Dr. Ing. Von Huddlemuck, read his carefully prepared paper, which dealt with the mining, ore dressing, metallurgy and application of serenium, the mysterious element (Periodic No. 0) responsible for the virtues of green sand.

Incorporated in iron, steel, and non-ferrous metals and alloys, this element confers truly marvelous properties. For example, such alloys are not subject to work-hardening, but have an elastic limit equal to their ultimate strength. This figure may reach 500,000 psi. in steel, combined with a ductility of 100% elongation and (of course) zero reduction of area. Furthermore, the density of steel may be as low as 2½; it is confidently expected that the near future will see alloys capable of floating in a vacuum.

Lack of space prevents printing all the physical data already revealed, but other chapters desiring to book Dr. Long may write to the International Nickel Co., New York.

Before question time members were treated to exceptionally fine readings of "Habitant" poems of the late Dr. Drummond, by Mr. Howard Turner. These were particularly appropriate at a "Steel Treaters" meeting because of the close connections of the Drummond family with the iron industry in Montreal (and most particularly appropriate was the poem about the Devil).

The final period was devoted to a discussion of pretzels and beer with congenial associates.

Forging, Heat Treating Operations Seen on Trip

Reported by F. G. Anderson

Rockford Chapter, Feb. 14—The February meeting consisted of a plant visitation to the Rockford Drop Forge Co. and Mechanics Universal Joint Co., made jointly with the Rockford Engineering Society. Both plants fabricate automotive parts, hence their requirements are varied, and the variety of steels used is correspondingly high.

The Drop Forge Co. has a storage capacity of several million pounds of steel in bars and billets, and a forging capacity of 2000 tons per month. Visitors were shown all operations from shearing the billets to pickling and sandblasting the finished forgings.

Forging furnaces are fired with oil using preheated air, and nearly all have automatic temperature control. Piping for oil, air, and steam is all underground in large tunnels — an arrangement yielding greater floor space and providing for orderly handling of materials in process. The forge shop itself is housed in a new, well-ventilated, all-steel building.

At the Mechanics Universal Joint Co., the heat treatment of steel is of vital importance. Equipment for normalizing forgings and hardening finished parts includes ingenious furnaces for localized hardening. All heat treating furnaces are fired with butane gas.

This company manufactures universal joints for numerous makes of cars, and their new roller bearing joint with oil-tight housing is gaining in popularity, due to decisive resistance to wear on the moving parts.

After four hours of sight-seeing in these two plants, the tired group adjourned at 11 p. m.

Motion Pictures, Lantern Slides Tell Story of Steel

Reported by J. E. Nordstrom

Peoria Chapter, April 8—C. C. Crane, technical chairman for the evening, introduced the speaker, L. S. Marsh, manager, Department of Inspection and Metallurgy, Inland Steel Co., whose talk on "The Manufacture of Carbon Steel form the Blast Furnace to the Finished Product" was illustrated with lantern slides and five reels of motion pictures.

They showed the construction and operation of blast furnace, open hearth, coke plant, blooming mill, rail mill, 10-in. merchant mill, 76-in. continuous hot strip mill, cold rolling mill, and tin plant. Of high educational value in themselves, the pictures were made doubly interesting by Mr. Marsh's running comments.

Interest in the manufacture of rails and the operation of the 76-in. hot strip mill ran particularly high in the discussion.

Charter Members Honored At Fifteenth Anniversary

Reported by Howard E. Handy

Boston Chapter, Feb. 8—"Fatigue of Metals" was the subject of a most interesting talk given by Prof. J. H. Zimmerman, of Massachusetts Institute of Technology. Professor Zimmerman, a member of the Boston Chapter, gave a general discourse on the subject of fatigue, and a lengthy discussion followed during which members from the Watertown Arsenal, Harvard University, M.I.T., and various manufacturing plants took part.

This meeting marked the 15th anniversary of the Boston Chapter and a dinner was served in honor of the charter members and past officers who are still members of the Chapter. Ten out of eleven of the present charter members attended and thirteen out of the fourteen who have been chairmen of the Chapter were present.

The coffee-talk was given by J. P. Dods of the Summerill Tubing Co., Philadelphia, who described the cold drawing of small tubing and supplemented his talk with an actual demonstration of tube drawing on the Summerill Miniature Draw Bench. One hundred persons attended the dinner and nearly 200 were present to hear Professor Zimmerman.

L. & N. Announces Limited Agreement with Kent

An agreement, applying only to the sale of industrial electro-chemical instruments and certain types of flowmeters, has been consummated between Leeds & Northrup Co. of the United States and George Kent Ltd. of Great Britain.

Under this agreement, Kent will not offer its industrial electro-chemical instruments or its flowmeters for sale in the United States or Canada unless through Leeds & Northrup, while Leeds & Northrup will not offer its similar instruments for sale in the British Empire (except Canada) unless through Kent. Neither the sale, in the States by Builder's Iron Foundry, of Kent venturi and shunt type rotary meters, nor the sale anywhere by either company or its agents, of products other than those specifically mentioned is in any way affected.

Tagliabue Promotes Wacker

The C. J. Tagliabue Mfg. Co., Brooklyn, N. Y., announces the appointment of E. D. Wacker as assistant general sales manager. Mr. Wacker has been with the company for 11 years, part of the time as manager of the Pittsburgh territory and, more recently, as division sales manager.

Fine as a Hair Too Coarse for Precision Parts Manufacturer

Chicago Chapter, March 14—The present tolerances possible through the use of properly designed abrasive machinery are not limited by the accuracy of the machines themselves so much as they are by the delicacy of available measuring devices. This was the claim advanced by Howard W. Dunbar, of the grinding machine division of the Norton Co.

The layman's standard, "fine as a hair," is far too coarse for the manufacturer of precision parts, Mr. Dunbar pointed out. A hair has a diameter of about 0.003 in., while hundreds of parts for the automobile and other high speed mechanisms are regularly machined to tolerances of 0.0001 in. or 1/30th the diameter of a hair.

While the delicacy of micrometers has been extended considerably by the use of optical instruments to aid the naked eye, even more delicate measuring devices are now available. One utilizes the action of a steel rod in disturbing extremely weak magnetic fields, which, by the use of diamond contacts and a system of relays and solenoids, can control abrasive operations to a point beyond that possible with visual measurement.

Another delicate test is the infrared ray. Infinitesimal imperfections in the surface are sufficient to cause refraction of part of the invisible ray into the visible spectrum.

The debt which our whole high speed machine civilization owes to modern abrasive machinery was emphasized by Mr. Dunbar. Only by improved methods of grinding, lapping, honing and polishing is it possible to produce the precision parts necessary to such machinery, and to work the lighter, tougher and harder alloys essential to speed.

Considerable interest was displayed in one of the latest abrasive products of the electric furnace, boron carbide. The crystals, made by fusing boric acid with carbon, are the only substance which equals the diamond in hardness. Developed within the last two years, they have already been used as a substitute for diamonds in fine wire dies.

Tool Steel Selector Offered

The Carpenter Steel Co. is offering to tool steel users in the U.S.A. only, a wall chart, 30x20 in., to be used as a means for selecting the proper type of tool steel.

Oil hardening, water hardening, and red hard steels are classified as to wear resistance and toughness, and their applications given. Copies may be had by addressing Carpenter Steel Co. 133 West Bern St., Reading, Pa.

Consulting Firm Formed

J. M. Lessells and G. B. Karelitz have commenced consulting activities with their headquarters in Swarthmore, Pa.

Their objective is to apply to certain industries new methods of scientific research in the solution of engineering problems of a mechanical, civil, or metallurgical nature.

Employment Service

Address answers care of A. S. M ., 7016 Euclid Ave., Cleveland, unless otherwise stated

METALLURGICAL ENGINEER: 12 years industrial experience, several years in charge of mills rolling alloy and special steels. Desires position in production department of a steel company. Box 5-5.

YOUNG METALLURGIST: 3 years analysis and metallurgical inspection. Desires position as foundry charge and cost record clerk with opportunity to advance to foundry metallurgist. Box 5-10.

EXECUTIVE METALLURGIST, metallographer, lecturer, teacher, author. Experience steels, non-ferrous metals, thermostatic and high expansion metals, tinsel tape, contact metals, amalgams, solders, etc. Six years experience on telephone material problems. Patents pending. Box 5-15.

SALES ORGANIZATION covering Illinois, Wisconsin, Indiana, Ohio and Western Pennsylvania, particularly Indiana, Ohio, and Illinois including Chicago, would like to secure additional accounts on commission covering tubing (stainless), strip steel, or allied line. Box 5-20.